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U.S. Rice Farms

A Regional Comparison

Robert Dismukes

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ABSTRACT

U.S. farms growing rice varied considerably among seven rice-growing regions, according to the 1984 Farm Costs and Returns Survey. This report summarizes and compares the production practices and costs of production of U.S. rice farms. Costs per acre of rice were greatest in California and on the Lower Coast of Texas. Rice growers in Northeast Arkansas and the Mississippi River Delta received the most favorable returns from rice. Returns were least favorable on the Lower Coast of Texas.

Keywords: Rice, farms producing rice, production practices, costs of production.

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SUMMARY

Rice production practices, costs, and returns varied among regions of the United States. According to budgets based on the 1984 Farm Costs and Returns Survey, costs were relatively high in California and on the Lower Coast of Texas and low in the Mississippi River Delta, Southwest Louisiana, and Northeast Arkansas rice-growing regions.

Tillage per planted acre was greatest in 1984 on the Lower Coast of Texas and least in Southwest Louisiana. On the Lower Coast of Texas, variable expenses, particularly those related to machinery use, were greatest. Expenses for pesticides, most of which were custom applied, were also greatest on the Lower Coast of Texas and smallest in Southwest Louisiana. Airplanes seeded almost all rice acreage in California, about 75 percent of the acreage in Southwest Louisiana, and about 60 percent on the Upper Coast of Texas. All rice acreage was irrigated. In California and on the Upper Coast of Texas, most rice acreage was irrigated with water purchased from canal companies or irrigation districts. Wells and surface sources (rivers, lakes, and ponds) provided most of the irrigation water in the Mississippi River Delta, Northeast Arkansas, the Grand Prairie, and Southwest Louisiana. On the Lower Coast of Texas, about half was irrigated from wells and half from canals.

Cropland acreage per farm was highest in the Mississippi River Delta. Average acreage planted to rice was highest on the Upper Coast of Texas and smallest on the Grand Prairie. More than 50 percent of the cropland on rice farms in the Delta, Northeast Arkansas, Southwest Louisiana, and on the Grand Prairie was planted to crops other than rice, most often soybeans.

Total variable expenses were highest on the Lower Coast of Texas, 17 percent greater than in the next highest region, the Upper Coast of Texas, and 76 percent greater than in the lowest region, Northeast Arkansas. On the Lower Coast of Texas, field operations per acre and the cost of purchased water were by far the highest of those in any region. High costs in California were offset by large cash receipts, the result of high yields. On the Lower Coast of Texas, despite above average yield, returns to an acre of rice were least favorable.

Total economic costs were lowest in the Mississippi River Delta. Every cost component was below the national average in the Delta. Total variable expenses in Northeast Arkansas were the lowest, although the amount of field operations was above average. Cash receipts, due to low yield, were lowest in Southwest Louisiana. Average receipts produced at low cost led to the most favorable returns in the Delta and Northeast Arkansas.

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INTRODUCTION

Rice, a major U.S. field crop, is critically important to the economies of the areas where it is produced. In Arkansas and Louisiana, for example, farmers earned 10-20 percent of their agricultural cash receipts in 1984 from rice (1, 3). 1/

How and where farmers grow rice influence its costs of production and, consequently, the returns to rice production. To estimate the costs of producing rice and other major field crops, the Economic Research Service (ERS) constructs crop-specific budgets that represent typical production practices and their costs in each State or, in the case of rice production, each region in which a significant amount of production takes place. These per-acre budgets, summaries of all operator and landlord costs and returns associated with the production of the crop, are aggregated by the proportion of total acreage they represent to produce regional and national estimates. ERS has constructed budgets for seven rice-growing regions.

Data for the budgets are obtained from published reports and from periodic surveys of producers. A sample of rice producers was surveyed about their production practices and expenses as part of the 1984 Farm Costs and Returns Survey (FCRS). Rice producers were previously surveyed in 1979 (5) and will be surveyed again about production practices in 1988. Survey data are supplemented and updated between surveys with information from the National Agricultural Statistics Service (NASS) and State agricultural statistics offices. This report summarizes and compares the operating characteristics, production practices, and costs of production of rice farms in the seven budget regions and the total United States. These data are the basis of ERS rice costs-of-production estimates for 1984-87 (6).

DATA SOURCES

ERS and NASS jointly conducted the 1984 FCRS in early 1985. The 1984 FCRS was a multiframe stratified survey composed of a list and an area frame. The list frame, made up of farmers known to have previously grown rice, was stratified by size. The area frame, aerial photographs of land

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1/ Underscored numbers in parentheses cite sources in the References section.

segments, was stratified by land use. The sample was drawn to represent the population of U.S. rice producers. 2/ Five hundred thirty-two rice farmers completed questionnaires. Each completed questionnaire or observation of rice production represented a number of rice farms with similar characteristics. NASS and ERS estimated the number represented, a survey expansion factor. The sample observations were then expanded to population estimates by weighting each observation by its expansion factor.

With each estimate comes a coefficient of variation, a measure of the statistical precision or dispersion of values about the estimate. For totals, coefficients of variation were derived from the variation in the sample strata, measuring the statistical precision of the estimate. Coefficients of variations of averages per farm are more complex. They are based on a ratio of two estimates: the variable of interest and the total number of farms. A coefficient of variation of a mean may be interpreted simply as the dispersion of values about their mean.

A coefficient of variation is a percentage, 100 times the standard error or deviation divided by the estimate, and can be used to construct a confidence interval about the estimate. For example, the estimated average U.S. rice acreage is 280 acres and its coefficient of variation is 7.97. This means that, according to the FCRS, about 68 percent of the rice farms in the United States planted between 258 and 302 acres of rice. 3/

LOCATION OF RICE PRODUCTION

U.S. farmers produced nearly 139 million hundredweight (cwt) of rice on 2.8 million acres of cropland in 1984, substantially above 1983 levels, when a Payment-in-Kind program was in effect (table 1). Figure 1 shows the seven rice-growing regions. The counties and crop reporting districts of each region are listed in appendix table 1. The rice-growing areas adjacent to the Mississippi River in Mississippi, Missouri, Louisiana, and Arkansas are referred to as the Mississippi River Delta. The Arkansas regions, in addition to the Delta, are the Grand Prairie, which is the south-central part of the State, and Northeast Arkansas, which is the area west of the Delta and northeast of the Grand Prairie. Along the gulf coast there are three regions: Southwest Louisiana, the Upper Coast and Lower Coast of Texas. The California region includes the Sacramento and San Joaquin Valleys.

More than 70 percent of the farms that produced rice in 1984 were located in the Mississippi River Delta, the Grand Prairie, and Northeast Arkansas (table 2). Approximately 60 percent of rice acreage was in the same three regions (table 3). Northeast Arkansas led the regions in total

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2/ The 1979 and 1984 surveys are not strictly comparable because of differences in sample design. In the 1979 Costs-of-Production Survey, the probability of a rice farmer being interviewed was proportional to acres of rice planted.

3/ About 68 percent of the probability density of a normally distributed random variable lies within one standard deviation above and one standard deviation below the mean. The standard deviation of mean U.S. rice acreage is 22.32.

acreage planted. The Lower Coast of Texas had the fewest acres of rice planted.

CHARACTERISTICS OF FARMS PRODUCING RICE

A farm's production situation, that is, its size, crop mix, and tenure (who owns the farm and how it is operated) affects costs of production and returns. A description of rice producers' situations follows.

Acreage

Average rice farm acreage was larger than average cash grain farm acreage. Rice farms operated 1,244 acres, while cash grain farms operated 647 acres per farm (4). The largest rice farms were in the Mississippi River Delta. Average acreage of rice, however, was greatest on the Upper Coast of Texas and smallest on the Grand Prairie.

Crop Mix

Farms that grew rice also produced other crops in 1984 (tables 3 and 4). More than 60 percent of the cropland on U.S. rice farms was planted to crops other than rice. In the Mississippi River Delta, Northeast Arkansas, the Grand Prairie, and Southwest Louisiana, more than 50 percent of the cropland on rice farms was planted to other crops. Rice farmers in these four regions planted more acres to soybeans than to rice. In Texas and California, more acres on rice farms were planted to rice than to other crops. Soybeans, sorghum, and corn were common alternate crops in Texas. California rice farms, which did not plant soybeans, produced sugar beets, alfalfa, and vegetables. Beef cattle were present on 30-40 percent of the rice farms in each of the two Texas regions and in Northeast Arkansas.

Farmers always irrigate rice, but most other crops on rice farms grow without irrigation. California rice growers, however, irrigated more acreage for other crops than rice.

Tenure of Operator

Cropland may be owned or rented by the producer, and the rent may be paid either in cash or as a share of the production. Rice farmers planted more of their rice on rented land than on land that they owned in 1984 (table 5). Nearly half of the U.S. rice acreage was share rented, and another 15 percent was cash rented. In the Grand Prairie, the Lower Coast of Texas, and Southwest Louisiana, more than half of the rice acreage was share rented. About 40 percent of the farms produced rice only on share-rented land.

Share Rental Agreements

A landlord typically receives a share of the tenant's rice production in exchange for providing land and paying portions of other costs under a share rental agreement. The share of production that a landlord receives varies with the amount of cost the landlord pays (table 6).

About 20 percent of the share agreements were for land only in 1984. In these cases, the landlord provided no other inputs.

About 25 percent of the agreements included only irrigation costs in addition to the land. Nearly all such agreements included a portion of the expenses for wells, except in California, where most water came from canals (table 7). The landlord most often paid the entire cost of an irrigation item.

Most share agreements included both irrigation and nonirrigation costs. Under these agreements, the landlord's share of production was the greatest. Nonirrigation items were most often fertilizers, pesticides, and rice drying (table 8). When a nonirrigation item was included, the landlord most often paid half of its cost.

Cash Rental Agreements

The landlord may share costs as part of a cash rental agreement. Such agreements arise mainly for irrigation expenses, as the landowner may also own or control water sources on or near the rented land. In 1984, about 20 percent of the cash rental agreements of rice provided that the landlord pay a portion of irrigation expenses (table 9). Under most of these agreements the landlord would pay the entire cost of the item: purchased irrigation water in California and the Lower Coast of Texas and wells in the other regions. Cash rents were highest in California and lowest on the Upper Coast of Texas (table 9).

RICE PRODUCTION PRACTICES

Farmers plant rice between March and May and harvest it between July and late October. Rice grows in standing water on land that has been leveled into paddies. Rice farmers construct semipermanent levees and flood the paddies either just before or just after seeding. They drain the paddies before harvest (2).

Technical Services

Surveying for levees was custom hired for most rice acreage in all regions except Southwest Louisiana and the Lower Coast of Texas (table 10). The per-acre expenditure for surveying was highest in California and lowest in Southwest Louisiana.

Other technical services, such as soil testing, were rarely hired in 1984 (table 10). In most regions, farmers hired technical services on less than 5 percent of the rice acreage.

Field Operations

Almost all rice production operations are mechanized, performed by the farm operators with their machinery or custom hired (table 11). The extent of each field operation is measured in times-over, which is the acreage covered in the operation divided by the total acreage planted to rice. Times-over describes the operations on an average acre of rice.

Table 12 shows what implements are used in field operations and their sizes. Other implements were less frequently used: disk plows rather than chisel plows in the Delta, Southwest Louisiana, and the Grand Prairie; heavy disks rather than regular tandem disks in California; roller and finishing harrows in Northeast Arkansas and the Grand Prairie; and broadcast seeders rather than plain disk drill seeders in Northeast Arkansas.

Tillage

Tillage constituted about 70 percent of the times-over for all field operations in each region. Total times-over for tillage, use of plows, disks, field cultivators, harrows, bedders and shapers, soil packers, and other tillage implements, was greatest on the Lower Coast of Texas, more than double the amount of times-over in Southwest Louisiana. The Lower Coast of Texas and Southwest Louisiana also ranked first and last in tillage in 1979. Most of the differences among regions in the amount of tillage centered on disking, harrowing, and packing during 1984. Rice farmers tilled less in 1984 than they did in 1979, according to the 1984 FCRS.

Seeding

Rice is seeded either from airplanes or from ground equipment. Airplanes must be used when farmers flood fields before seeding. Seed drills or broadcast seeders may be used when seeding precedes flooding. Aerial seeding is almost always a custom-hired operation.

Seeding from airplanes was more common than seeding from ground equipment in California, Southwest Louisiana, and the Upper Coast of Texas (table 13). Ninety-seven percent of the rice acreage in California and 78 percent in Southwest Louisiana were aerial-seeded. Rice farmers in Arkansas used air seeding least.

The mix of seeding methods has changed little between 1979 and 1984. Drill seeding was popular in 1984 on the Grand Prairie, Northeast Arkansas, and the Delta. Air seeding in both years was confined largely to California, Southwest Louisiana, and the Upper Coast of Texas.

Seeding rates were higher on aerial-seeded land than on land seeded with ground equipment. The seeding rate was highest for aerial-seeded acreage in California and lowest for drill-seeded acreage on the Upper Coast of Texas.

Fertilizer

Farmers can apply fertilizer to rice fields from airplanes or from ground equipment, depending upon whether the field is flooded at the time. The initial application, usually at planting, may be handled by ground equipment if the field has not yet been flooded. Airplanes usually provide subsequent applications on flooded fields. Table 14 shows fertilizer application rates on rice acreage in 1984.

Pesticides

Rice pests can be controlled by planting disease-resistant varieties, by plowing, and by applying chemical pesticides. Pesticides may be applied to rice seeds or sprayed on rice paddies, irrigation ditches, and levees.

Rice farmers on the Lower Coast of Texas spent the most on pesticides per planted acre and Southwest Louisiana farmers spent the least (table 15). These two regions also ranked first and last in pesticide expenditures in 1979.

Weed control was the major reason for the use of chemicals in rice production in 1979. Chemical costs for weed control ranged between 77 and 99 percent in 1979. Data on types of pesticides were not available from the 1984 survey.

Hand Labor

Some hand labor is required to grow rice (table 16). More than 75 percent of the hours of hand labor in every region except California focused on irrigation-related activities. The greatest amount of hand labor per acre was required in flooding and walking levees to attend to water. Total hours of hand labor per acre was greatest in the Mississippi River Delta and smallest on the Grand Prairie in 1984. Rice farms on the Lower Coast of Texas used the most hand labor per acre and Southwest Louisiana the least in 1979.

Irrigation

All rice acreage in 1984 was irrigated, and the water came from three general sources: wells, canals (purchased water), and surface sources (lakes and rivers). The chief water source differed from region to region (table 17). Most rice acreage received water purchased from canal companies, associations, or irrigation districts in California and on the Upper Coast of Texas. Half of the acreage was irrigated with purchased water and half with water from wells on the Lower Coast of Texas. Farmers flooded about 20 percent of the acreage with purchased water in Southwest Louisiana. Most rice was irrigated with well water elsewhere.

A rice farmer typically drew irrigation water from only one source. Fewer than 10 percent of the farms in 1984 commingled irrigation water from different sources. Sources of irrigation water appear to have been about the same in 1984 and 1979. In California and Southwest Louisiana, however, more acres were reported irrigated with purchased water in 1984. Commingling of irrigation water sources was also rare in 1979.

Pumps

Irrigation pumps can draw underground water from wells or pump water over the sides of a canal from one field to another. The 1984 FCRS made no measure of the depth of the wells or the pumping lifts. Analysts combined data for all pumps used in rice production (table 18).

Pumps were most numerous per farm in the two Arkansas areas and in the Mississippi River Delta, where well water was most common. (Wells in these areas drew from less than 500 feet, according to the 1979 survey.) Electricity powered most pumps in the two Arkansas areas. Electricity and diesel split as power sources in the Delta. Electricity was also the most frequent power source for pumps in California. Diesel was the favored fuel in Southwest Louisiana and the Upper Coast of Texas. On the Lower Coast of Texas, rice farmers favored natural gas.

Tractors, Combines, Buggies, and Trucks

Rice farmers use tractors mainly to build levees and ditches and to prepare the land for seeding. Farmers harvest the crop with combines and transport the grain from the combines to trucks by rice buggies.

The tractors, combines, buggies, and trucks described by farmers in the FCRS were either owned, rented, or leased for the entire 1984 growing season. Equipment used in a custom-hired operation was not included; its cost was included in the custom charge.

Tractors

Table 19 presents a description of the tractors used in rice production in 1984. Two-wheel-drive tractors were the most common. Seventy-five percent of the tractors on rice farms were two-wheel-drive, and, on average, farms in every region except California had two or more two-wheel-drive tractors. About 18 percent of tractors were four-wheel-drive. Crawler tractors, about 5 percent of the tractors on rice farms, were most common in California. More than 90 percent of the crawlers were located in this State. Farmers drove four-wheel-assisted tractors in every region except the Lower Coast of Texas. The Delta contained more than half of the four-wheel-assisted tractors.

More than 90 percent of all tractors were diesel powered (table 19). Four-wheel-drive tractors, on average, provided the greatest takeoff horsepower and two-wheel-drive tractors the least. Forty percent of the two- and four-wheel-drive tractors owned by rice farmers were bought used (table 20). Tractors in California were the oldest.

Combines

A rice farmer also typically used more than one combine to harvest his crop in 1984 (table 21). Farmers on Texas upper and lower coasts averaged more than two combines per farm. Nearly all combines on rice farms were owned, not leased, and most were purchased new, except for two-wheel-drive combines in Northeast Arkansas and California. Two-wheel-drive combines were the most popular in every region except California, where 97 percent of the combines were either track or combination track and wheel drive.

A similar distribution of drive types of combines occurred in 1979 with two exceptions: in California, 56 percent of the combines were track drive in 1979, and 75 percent in 1984; in Northeast Arkansas in 1979 just 1 percent of combines were combination drive, but by 1984, an estimated 22 percent of the combines were. The four-wheel-drive combines were

newer than the two-wheel-drive combines, an average of 2 to 5 years newer, depending upon the region (table 21).

Rice Buggies

Rice farmers drain the fields shortly before harvest. Because fields are then too damp to support trucks, rice buggies, which have large tractorlike tires, transport the crop from the combines to the trucks.

Ninety percent of the farms had at least one rice buggy (table 22). Growers used more buggies than combines in Northeast Arkansas, Grand Prairie, Southwest Louisiana, and the Lower Coast of Texas. Rice buggies in California had the greatest average capacity and were most often self-propelled. Buggies were most often pulled by tractors in other regions.

Trucks

Pickup trucks, used on 91 percent of rice farms, were the most common type of truck in 1984 (table 23). Mileage per pickup was greatest in the Delta.

Most rice farmers also had larger trucks. Eighty-six percent of the farms had at least one truck larger than a pickup. Of these, single-axle trucks were the most common. All regions, except the Lower Coast of Texas, averaged more than one single-axle truck per farm.

Gasoline powered more than 90 percent of the single-axle trucks. The average year of manufacture of a single-axle truck ranged from 1966 on the Grand Prairie to 1974 in the Delta.

There were about four times as many single-axle trucks than tandem-axle trucks on rice farms in 1984. There were fewer semitrucks than tandem-axle trucks. Eighty-five percent of the semitrucks on rice farms were located in the two Arkansas areas plus the Delta.

Post-Harvest Operations

Growers harvest rice at about 20-percent moisture and dry it to about 13-percent moisture. Otherwise, producers sell rice "green." Rice drying may take place in the farmer's own dryer, located on the farm, or in a commercial dryer. Rice may be hauled to the dryer in the farmer's own truck, or it may be custom-hauled.

Drying

Producers dried about three-fourths of the 1984 rice crops, mostly in commercially operated off-farm dryers (table 24). On the Lower Coast of Texas, growers dried more than 90 percent commercially. Only in Southwest Louisiana was onfarm drying most popular. In California and the Upper Coast of Texas, almost all rice was commercially dried. About half the crop was producer-dried on the Grand Prairie. Delta growers sold two-thirds of their rice green. Most farms on the Grand Prairie sold their entire crop green, and purchasers subsequently dried it. Less rice was sold green in 1979.

Natural gas was the most popular fuel for onfarm drying in Southwest Louisiana and the Lower Coast of Texas (table 25). Liquefied petroleum gas was most popular in the Delta, on the Grand Prairie, and in California. Electricity was common in Northeast Arkansas and on the Upper Coast of Texas.

Hauling

Rice farmers used their own trucks to haul all rice dried onfarm (table 26). Only on the Upper Coast of Texas was more than 20 percent of the onfarm dried crop custom-hauled. Growers also drove their own trucks to haul rice dried off the farm to commercial dryers. Only on the Lower Coast of Texas and in California was more than half the commercially dried crop custom-hauled to the dryer.

RICE PRODUCTION COSTS AND RETURNS

Table 27 shows estimates of the average costs and returns per acre of rice in 1984, the year that the FCRS obtained detailed production practice data for rice. The estimates were calculated with the aid of the FEDS budget generator. The structure of accounts and the methodology came from the annual Economic Indicators of the Farm Sector: Costs of Production (6). Costs are summarized as variable expenses, capital replacement, fixed expenses, and economic costs, which are subtracted from cash receipts. The difference between cash receipts and economic costs is a return to management and risk.

Cash Receipts

Cash receipts are the average per-planted-acre yield multiplied by the harvest-month average price for rice. Direct Government payments, storage costs, and changes in the value of assets are not included.

Rice prices and, thus, the cash receipts reported should be used with caution. 4/ The prices were estimated based on the proportion of each rice grain type produced in each region and the Commodity Credit Corporation (CCC) loan rate differential for each type of rice. 5/

Cash receipts per planted acre of rice were highest in California in 1984. Medium- and short-grain rice, which produce higher yields than long-grain, were most common in California. Medium and short grains brought lower prices, but their yields in 1984 were sufficiently large to result in cash receipts per acre that were higher than those for long grain. On the Lower Coast of Texas, the next highest area in cash receipts and a long-grain area, both yield and price were above the national average. Ratoon cropping (second cutting) was prevalent there. In Southwest Louisiana and the Delta, both yield and the price of rice were below the national average. Cash receipts were lowest in Southwest Louisiana.

4/ NASS cannot, due to confidentiality restrictions, directly disclose State-level harvest-month price estimates for rice.

5/ The CCC loan rate in 1984 was $9.12 per cwt for long-grain rice and $6.80 per cwt for medium- and short-grain rice.

Cash Expenses and Capital Replacement

Cash expenses (out-of-pocket costs incurred during production) are divided into variable and fixed expenses. Capital replacement is a charge for replacing buildings and machinery.

Variable expenses

Variable expenses per acre planted in 1984 were greatest on the Lower Coast of Texas, 17 percent greater than in the next highest region, the Upper Coast of Texas, and 76 percent more than in the lowest region, Northeast Arkansas. Producers on the Lower Coast of Texas undertook more field operations than producers in any other region. Total times-over for field operations on the Lower Coast of Texas was 50 percent above the national average. The second harvest of rice accounts for some of the difference, but there was also substantially more tillage than average on the Lower Coast of Texas. The more field operations are performed, the more equipment is used, resulting in higher fuel and capital replacement expenses, two items in which the Lower Coast of Texas ranked first.

Producers on the Lower Coast of Texas also paid more for purchased water. Their average expense for purchased water was more than 30 percent higher than on the Upper Coast of Texas and more than 180 percent higher than in California. Some of the difference may be attributed to ratoon cropping: fields are drained, cut, and flooded again. It is impossible to determine which region had the greatest total irrigation expense per acre. The costs of well water, about half the irrigation water on the Lower Coast of Texas, were included with other machinery costs for fuel, lube, electricity, and repairs.

Custom operations, another variable expense, were also higher than average on the Lower and Upper Coasts of Texas and in California. Expenses for custom-hired applications of chemicals were above average in each of these regions and in California, where extensive air seeding also contributed to the higher than average expense.

Variable expenses were lowest on the Grand Prairie, in Northeast Arkansas, and the Delta. Although the times-over of field operations on the Grand Prairie and Northeast Arkansas and the pesticide expenses in the Delta were above average, total variable expenses were low. Expenses for custom operations were especially low, because virtually no air seeding occurred in these regions. Rates for drying rice and applying phosphorus were also below the national average on the Grand Prairie and in Northeast Arkansas.

Fixed Expenses

Fixed expenses per acre, actual expenditures attributed to an acre of rice, were greatest in 1984 in California and smallest in Southwest Louisiana. Fixed expenses in California were more than double the fixed expenses on the Lower Coast of Texas, the next highest region. Much of this difference was in interest paid, which was double the national average in California.

General farm overhead, expenses for utilities, licenses, and accounting, was also nearly double the national average in California. Rice

producers in California also paid the most per acre for taxes and insurance.

Receipts Less Cash Expenses and Capital Replacement

The difference between cash receipts and cash expenses in 1984 was greatest on the Grand Prairie and in Northeast Arkansas. The difference was more than five times what it was on the Upper Coast of Texas, where it was smallest.

The cost of capital replacement, which is based on the farm machinery and buildings owned by a rice producer, was greatest on the Lower Coast of Texas, the Grand Prairie, and in California. When the cost of capital replacement was included in expenses, the difference between cash receipts and expenses was most favorable in Northeast Arkansas. The gap between receipts and expenses was least favorable on the Lower Coast of Texas.

Economic Costs and Returns

Economic costs are the longrun costs of producing rice. They are all cash expenses, except interest payments, plus values that are imputed to capital, land, and the farmer's own labor. The economic return to management and risk is a residual, the difference between economic costs and cash receipts. Economic costs are full-ownership costs and allow comparisons among regions without regard to the debt and land ownership positions of the producers.

Returns to operating capital, other nonland capital, land, and unpaid labor, are imputed from values of these resources in their next best alternative use. For operating capital, the return is measured based on the 6-month U.S. Treasury bill rate. For other nonland capital, it is the longrun rate of return to production assets in the farm sector. For land, it is net land rent, and for unpaid labor, the imputed value is the average wage rate.

The return imputed to operating capital was greatest in the two Texas areas and California, regions that also had the greatest variable cash expenses. It was lowest in Southwest Louisiana, followed by Northeast Arkansas, the Delta, and the Grand Prairie, all areas with relatively low variable expenses.

The return to other nonland capital, farm machinery and irrigation equipment, was above average in California and on the Grand Prairie and the Lower Coast of Texas. The greatest variation in imputed costs among the regions was in net land rent. Rent was highest in California, where cash rents were the highest by far, followed by the Grand Prairie, Northeast Arkansas, and Southwest Louisiana. Net rent was lowest on the Upper Coast of Texas, a region with relatively low cash rents and little share renting.

Total economic cost per acre was greatest in California, but large cash receipts pushed the residual return to management and risk above the national average. The residual return, the longrun return to rice production under 1984 conditions, was most favorable in Northeast Arkansas and least favorable on the Lower Coast of Texas, though in every region the return was negative.

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Table 1—Rice acreage, yield, and production, 1979-84

Year	Acres planted	Production	Yield
	1,000 acres	1,000 cwt	Cwt per acre
1979	2,980	131,947	45.66
1980	3,380	146,150	43.24
1981	3,827	182,742	47.75
1982	3,295	153,637	46.63
1983	2,190	99,720	45.53
1984	2,830	138,810	49.05

Source: (8).

Figure 1.

Major U.S. rice areas

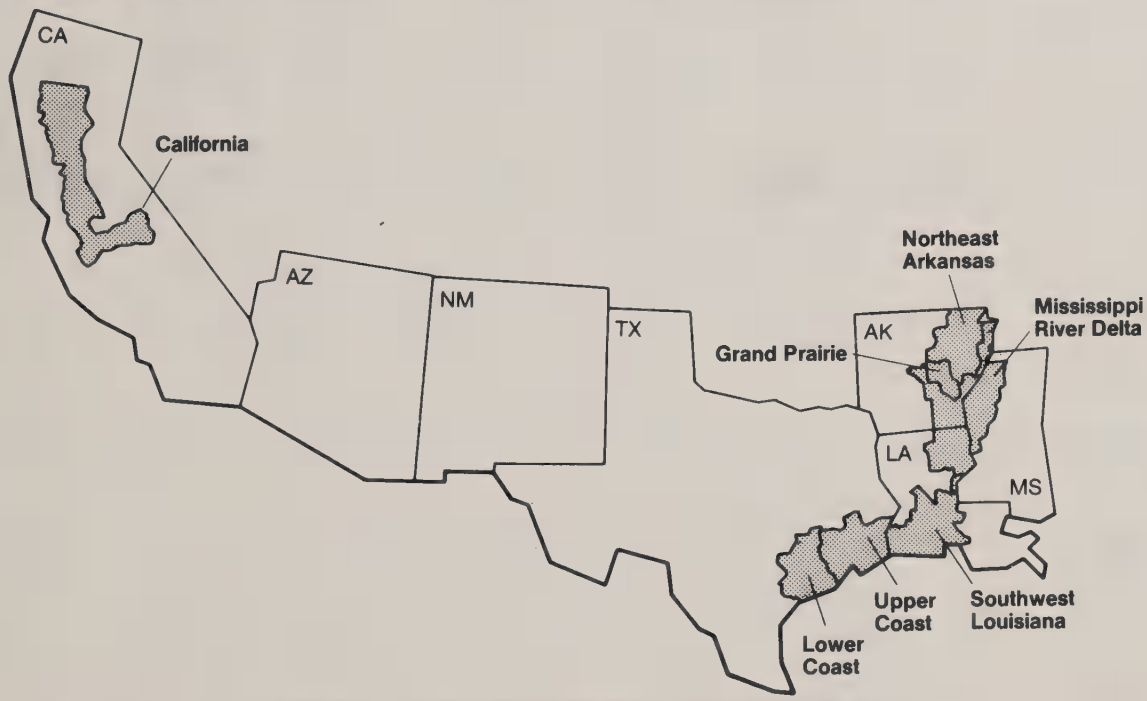

Table 2—Farms producing rice and acres of land owned, rented, and operated, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Farms	2,013	2,805	2,289	1,241	411	390	924	10,073
				Acres				
Land in farms: 1/								
Total	4,096,892	2,671,578	2,350,124	1,300,246	797,403	498,178	1,270,338	12,984,760
Average 2/	2,035	952	1,027	1,048	1,940	1,278	1,375	1,289
Land owned—								
Total	1,317,977	702,600	528,845	245,933	195,928	92,608	787,312	3,871,203
Average 2/	655	250	231	198	477	238	852	384
Land rented to operator—								
Total	2,778,915	1,968,979	1,821,279	1,054,313	601,475	405,570	483,026	9,113,557
Average 2/	1,381	702	796	850	1,463	1,041	523	905
Land rented by operator to others:								
Total	85,662	9,863	19,775	25,831	78,097	12,058	224,491	455,778
Average 2/	43	4	9	21	190	31	243	45
Land operated: 3/								
Total	4,011,230	2,661,716	2,330,349	1,274,415	719,305	486,119	1,045,847	12,528,982
Average 2/	1,993	949	1,018	1,027	1,750	1,247	1,132	1,244
				Coefficient of variation				
Farms	27.18	27.29	33.16	8.59	9.43	9.35	4.35	11.07
Land in farms: 1/								
Total	27.87	27.90	38.39	13.80	19.79	16.78	16.09	12.06
Average 2/	20.72	6.84	9.26	12.20	18.41	14.30	16.00	7.23
Land owned—								
Total	30.18	23.35	29.25	44.00	35.84	20.71	24.48	12.80
Average 2/	37.08	18.37	40.83	43.78	35.54	18.71	24.46	15.39
Land rented in—								
Total	31.94	31.73	48.80	13.55	21.22	19.54	15.23	14.76
Average 2/	17.16	9.39	18.85	11.70	19.8	15.06	15.06	7.38
Land rented out:								
Total	54.12	73.22	57.71	65.45	75.84	42.79	47.81	29.11
Average 2/	58.71	77.05	64.57	65.69	75.61	41.81	47.91	31.08
Land operated: 3/								
Total	28.20	28.00	38.68	13.33	16.59	17.07	15.15	12.36
Average 2/	20.74	6.88	9.47	11.60	14.84	14.65	14.98	7.22

1/ Land in farms = land owned plus land rented in.
2/ Mean per farm producing rice.
3/ Land operated = land owned plus land rented in minus land rented out.

Table 3—Cropland and acres planted in rice and other crops on farms producing rice, 1984 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Acres				
Cropland:								
Total	3,530,324	2,173,490	1,952,389	949,811	368,084	268,315	570,855	9,813,268
Average 2/	1,754	775	853	765	895	688	617	974
Rice—								
Total planted	632,933	694,268	374,253	380,938	199,484	158,152	377,625	2,817,653
Average 2/	314	248	164	307	485	406	409	280
Soybeans—								
Total planted	2,333,976	1,228,640	1,488,297	518,742	133,473	27,820	0	5,730,949
Average 2/	1,160	438	650	418	325	71	NA	569
Cotton—								
Total planted	334,696	16,853	5,953	17,300	0	0	15,562	390,365
Average 2/	166	6	3	14	NA	NA	17	39
Wheat—								
Total planted	677,099	470,068	424,655	18,020	15,877	9,996	70,792	1,686,507
Average 2/	336	168	185	15	39	26	77	167
Other grains—								
Total planted	174,997	159,824	64,426	20,805	22,559	72,125	53,924	568,695
Average 2/	87	57	28	17	55	185	58	56
Other crops—								
Total planted	170	0	0	0	0	3,116	55,747	59,032
Average 2/	3/	NA	NA	NA	NA	8	60	6
				Coefficient of variation				
Cropland:								
Total	29.25	26.43	44.07	12.07	14.80	16.13	10.26	14.24
Average 2/	26.65	9.71	13.16	9.99	12.85	13.97	10.59	10.33
Rice—								
Total planted	26.86	27.43	24.36	12.71	13.09	11.34	9.79	9.2
Average 2/	26.63	9.37	15.62	11.06	11.11	7.50	9.64	7.97
Soybeans—								
Total planted	32.90	25.46	52.19	11.59	17.54	50.36	NA	19.08
Average 2/	27.17	12.38	21.60	9.14	15.36	49.47	NA	13.53
Cotton—								
Total planted	29.43	99.14	68.05	91.23	NA	NA	96.90	26.17
Average 2/	24.57	101.41	75.07	91.40	NA	NA	96.83	25.33
Wheat—								
Total planted	43.45	29.90	37.05	66.51	52.07	87.81	24.63	20.65
Average 2/	43.66	15.29	12.65	66.46	51.55	87.20	24.59	17.59
Other grains—								
Total planted	43.96	27.67	32.41	45.89	44.85	22.93	28.34	16.17
Average 2/	20.92	27.37	43.22	44.95	44.22	20.84	28.20	14.41
Other crops—								
Total planted	87.43	NA	NA	NA	NA	92.76	31.96	30.58
Average 2/	92.01	NA	NA	NA	NA	92.17	31.88	32.52

NA = Not applicable.
1/ Crop acreage may exceed cropland due to double cropping.
2/ Mean per farm producing rice.
3/ Less than an acre.

Table 4—Other crops on farms producing rice, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Acres				
Soybeans:								
Irrigated—								
Total planted	294,029	355,943	418,258	7,159	0	5,054	0	1,080,443
Average 1/	146	127	183	6	NA	13	NA	107
Nonirrigated—								
Total planted	2,039,946	872,696	1,070,040	511,584	133,473	22,766	0	4,650,506
Average 1/	1,014	311	468	412	325	58	NA	462
Cotton:								
Irrigated—								
Total planted	130,963	0	1,260	0	0	0	15,562	147,784
Average 1/	65	NA	1	NA	NA	NA	17	15
Nonirrigated—								
Total planted	203,734	16,853	4,693	17,300	0	0	0	242,580
Average 1/	101	6	2	14	NA	NA	NA	24
Wheat:								
Irrigated—								
Total planted	1,080	0	0	0	0	0	50,269	51,348
Average 1/	1	NA	NA	NA	NA	NA	54	5
Nonirrigated—								
Total planted	676,019	470,068	424,555	18,020	15,877	9,996	20,523	1,635,159
Average 1/	336	168	186	15	39	26	22	162
Sorghum:								
Nonirrigated—								
Total planted	159,636	124,045	22,083	17,574	17,181	40,880	449	381,849
Average 1/	79	44	10	14	42	105	2/	38
Other grains:								
Irrigated—								
Total planted	14,625	32,485	42,146	0	0	9,361	47,999	146,616
Average 1/	7	12	18	NA	NA	24	52	15
All other secondary crops:								
Irrigated—								
Total planted	0	0	0	0	0	77	76,717	76,794
Average 1/	NA	NA	NA	NA	NA	2/	83	4
Nonirrigated—								
Total planted	904	3,295	232	3,231	5,378	24,999	5,476	43,516
Average 1/	2/	1	2/	3	13	64	6	4
All secondary crops:								
Irrigated—								
Total planted	440,697	388,428	461,664	7,159	0	14,492	190,547	1,502,986
Average 1/	219	138	202	6	NA	37	206	149
Nonirrigated—								
Total planted	3,080,241	1,486,957	1,521,704	567,709	171,909	98,641	26,448	6,953,610
Average 1/	1,530	530	665	458	418	253	29	690

See notes at end of table.

Continued—

Table 4—Other crops on farms producing rice, 1984—Continued

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
	Coefficient of variation							
Soybeans:								
Irrigated—								
Total planted	29.87	37.03	26.38	91.23	NA	67.10	NA	17.14
Average 1/	37.06	18.18	38.48	91.40	NA	66.79	NA	16.21
Nonirrigated—								
Total planted	37.22	25.12	71.67	11.75	17.53	59.74	NA	23.19
Average 1/	30.42	18.95	41.12	9.28	15.63	58.90	NA	17.95
Cotton:								
Irrigated—								
Total planted	38.11	NA	89.09	NA	NA	NA	96.90	35.28
Average 1/	44.85	NA	94.90	NA	NA	NA	96.83	36.86
Nonirrigated—								
Total planted	32.87	99.14	78.32	91.23	NA	NA	NA	29.19
Average 1/	17.18	101.41	84.40	91.40	NA	NA	NA	27.03
Wheat:								
Irrigated—								
Total planted	72.34	NA	NA	NA	NA	NA	29.88	29.30
Average 1/	77.75	NA	NA	NA	NA	NA	29.77	31.31
Nonirrigated—								
Total planted	43.61	29.90	37.05	66.51	52.08	87.81	39.55	21.28
Average 1/	43.72	15.29	12.65	66.46	51.55	87.19	39.70	18.12
Sorghum:								
Nonirrigated—								
Total planted	47.57	31.96	58.37	51.88	46.63	23.67	93.44	22.67
Average 1/	24.23	29.00	64.27	51.08	45.85	21.54	93.47	19.48
Other grains:								
Irrigated—								
Total planted	58.31	38.11	36.61	NA	NA	50.81	30.94	17.60
Average 1/	61.80	44.84	46.99	NA	NA	50.25	30.85	20.50
All other secondary crops:								
Irrigated—								
Total planted	NA	NA	NA	NA	NA	89.76	37.44	40.00
Average 1/	NA	NA	NA	NA	NA	89.54	33.02	31.89
Nonirrigated—								
Total planted	55.20	99.01	99.14	93.29	59.68	44.32	69.81	29.61
Average 1/	61.31	101.58	102.72	92.75	59.65	43.19	69.58	31.55
All secondary crops:								
Irrigated—								
Total planted	23.70	34.28	24.71	91.23	NA	51.65	23.17	13.23
Average 1/	32.55	16.37	37.47	91.40	NA	51.15	23.01	13.59
Nonirrigated—								
Total planted	36.25	24.63	60.14	12.89	20.78	36.30	36.76	20.80
Average 1/	29.51	15.14	29.48	10.81	19.25	34.91	36.79	15.76

NA = Not applicable.
1/ Mean per farm producing rice.
2/ Less than an acre.

Table 5—Tenure of operator on land in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent				
Rice acreage:								
Owned	48.0	48.0	28.5	18.9	18.3	10.7	44.7	36.9
Cash rented	28.3	3.9	12.2	5.6	44.7	27.9	10.3	15.8
Share rented	22.9	48.1	59.3	74.6	36.3	61.4	45.0	47.0
Rent free	.8	0	0	.9	.7	0	0	.3
Farms with entire rice acreage:								
Owned	22.1	36.1	17.2	7.6	8.1	6.7	35.9	23.2
Cash rented	41.0	4.8	9.5	2.3	41.2	24.6	8.5	15.4
Share rented	19.5	32.8	59.6	69.7	28.5	41.4	25.0	40.2
Rent free	2.9	0	0	1.8	0	0	0	.1
Combination owned and rented	14.6	26.3	13.7	18.7	22.2	27.3	30.7	20.4
				Coefficient of variation				
Rice acreage:								
Owned	29.32	29.22	31.97	39.72	24.78	28.53	13.42	34.51
Cash rented	10.57	47.31	40.25	44.08	11.00	14.67	35.78	40.27
Share rented	30.54	27.66	17.90	9.87	17.74	8.08	12.99	28.30
Rent free	103.55	NA	NA	98.09	92.79	NA	NA	83.20
Farms with entire rice acreage:								
Owned	26.39	71.50	34.49	45.10	40.88	45.83	16.06	59.27
Cash rented	62.66	61.50	49.13	79.29	17.54	23.37	35.79	44.73
Share rented	29.40	22.17	54.12	11.84	21.17	16.60	19.71	40.64
Rent free	99.14	NA	NA	97.70	NA	NA	NA	87.69
Combination owned and rented	31.55	36.47	38.11	10.53	11.64	11.89	8.69	20.13

NA = Not applicable.

Table 6—Share rental agreements for land in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Agreements	604	1,587	1,619	1,076	164	240	477	5,767
				Percent of agreements				
Land only	37.1	18.5	7.2	26.0	39.3	7.8	12.6	18.3
Land and irrigation costs only	8.5	28.4	44.3	22.8	0	3.0	3.4	25.8
Land, irrigation, and other input costs	49.1	37.9	47.4	35.1	41.8	35.3	56.7	42.8
Land and nonirrigation costs only	5.3	15.2	1.1	16.1	18.9	53.9	27.3	13.1
				Percent of production				
Average share received: 1/								
Land only	23.3	D	27.5	20.1	13.3	D	24.2	22.6
Land and irrigation costs only	27.5	25.3	D	25.3	NA	D	D	25.1
Land, irrigation,and other input costs	37.7	29.7	47.4	34.5	47.8	42.0	33.0	37.3
Land and nonirrigation costs only	D	25.1	D	20.3	12.2	14.5	26.1	21.8
				Coefficient of variation				
Agreements	23.05	15.62	46.01	9.77	16.85	13.03	11.36	31.86
Land only	30.98	38.29	79.73	22.91	22.97	51.49	39.83	40.40
Land and irrigation costs only	48.34	28.54	57.13	24.17	NA	91.28	95.56	45.06
Land, irrigation, and nonirrigation costs	24.50	23.23	46.51	16.91	21.54	20.05	13.43	33.53
Land and nonirrigation costs only	64.44	42.46	106.68	31.06	44.07	13.79	25.32	46.14
Average share received: 1/								
Land only	4.69	NA	6.42	3.25	5.03	NA	6.42	2.64
Land and irrigation costs only	4.43	1.28	NA	8.80	NA	NA	NA	12.86
Land, irrigation, and nonirrigation costs	12.59	7.50	5.69	6.26	3.92	8.44	3.50	8.14
Land and nonirrigation: costs only	NA	.39	NA	3.56	2.37	13.49	3.90	28.41

NA = Not applicable.
D = Insufficient data for disclosure.
1/ Mean per type of share rental agreement.

Table 7—Costs included in rice production share rental agreements for land and irrigation only, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent of agreements				
Wells	100.0	98.9	100.0	88.6	NA	100.0	0	96.7
Purchased water	0	0	0	0	NA	0	100.0	1.1
Surface water	11.7	0	0	2.4	NA	0	0	.8
Pumps	75.1	74.8	100.0	82.0	NA	100.0	0	87.4
Pump repairs	61.1	77.5	100.0	91.0	NA	100.0	0	89.3
Motors	61.0	28.2	100.0	88.6	NA	100.0	0	73.9
Motor repairs	18.0	28.2	100.0	88.6	NA	100.0	0	72.4
Distribution systems	8.3	11.2	100.0	79.6	NA	0	0	65.0
System repairs	0	11.2	100.0	53.7	NA	0	0	60.4
Power or fuel	0	12.9	0	79.7	NA	0	0	17.0
				Coefficient of variation				
Wells	NA	1.02	NA	9.73	NA	NA	NA	.74
Purchased water	NA	NA	NA	NA	NA	NA	NA	122.89
Surface water	99.21	NA	NA	93.10	NA	NA	NA	98.69
Pumps	21.19	19.75	NA	13.60	NA	NA	NA	6.75
Pump repairs	35.04	17.99	NA	9.20	NA	NA	NA	3.55
Motors	35.04	53.21	NA	9.73	NA	NA	NA	13.99
Motor repairs	64.59	53.21	NA	9.73	NA	NA	NA	14.51
Distribution systems	99.83	94.32	NA	14.18	NA	NA	NA	19.51
System repairs	NA	94.32	NA	25.95	NA	NA	NA	20.98
Power or fuel	NA	91.69	NA	14.18	NA	NA	NA	90.06

NA = Not applicable.

Table 8—Costs included in rice production share rental agreements for land, irrigation, and nonirrigation inputs, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent of agreements				
Irrigation:								
Wells	100.0	96.9	85.8	60.3	0	42.7	19.7	76.0
Purchased water	0	0	0	23.6	93.4	49.3	67.1	15.2
Surface water	0	0	23.2	17.7	0	0	14.2	11.5
Pumps	63.4	38.9	92.4	73.8	7.5	44.6	45.4	63.8
Pump repairs	55.9	38.9	92.4	83.2	7.5	36.6	50.6	64.7
Motors	59.8	13.6	92.4	78.0	7.5	36.2	29.3	57.0
Motor repairs	58.7	3.1	92.4	78.0	7.5	20.2	39.3	53.0
Distribution systems	52.4	0	51.7	70.6	15.0	30.1	28.3	32.4
System repairs	8.0	0	51.7	70.6	15.0	28.2	28.3	32.4
Power or fuel	52.4	11.5	83.4	78.0	15.0	30.1	23.2	51.8
Nonirrigation:								
Seed	45.9	14.6	85.8	17.7	100.0	71.4	9.0	44.7
Fertilizer	73.3	99.2	100.0	66.7	92.5	77.4	61.8	86.3
Pesticide	34.2	24.3	93.4	59.3	100.0	77.4	58.4	60.0
Harvesting	0	0	0	0	0	8.5	0	.3
Hauling	0	8.4	0	17.8	33.8	30.6	17.1	8.6
Drying	94.6	22.0	84.6	54.8	80.3	73.3	85.8	65.5
Storage facilities	81.9	9.7	68.6	42.2	63.8	52.6	41.3	48.2
Storage operating	82.4	.8	75.2	42.2	73.7	61.1	19.1	46.2
Marketing	88.0	3.1	70.0	63.9	72.8	67.2	11.0	48.5
				Coefficient of variation				
Irrigation:								
Wells	23.02	9.65	12.75	23.57	NA	29.35	41.49	6.69
Purchased water	NA	NA	NA	37.94	10.66	28.25	15.51	35.11
Surface water	NA	NA	50.30	47.66	NA	NA	49.65	54.04
Pumps	42.24	43.14	12.29	19.03	90.66	25.77	21.77	16.69
Pump repairs	52.06	47.36	15.82	26.58	93.85	33.50	22.46	17.14
Motors	52.02	70.28	15.82	26.95	93.85	28.81	26.84	17.72
Motor repairs	52.73	102.86	15.82	26.95	93.85	49.90	26.84	19.33
Distribution systems	100.96	NA	27.52	30.94	68.41	31.16	34.17	29.74
System repairs	100.96	NA	27.52	30.94	68.41	38.15	34.17	29.77
Power or fuel	52.73	82.25	15.25	26.95	59.13	31.31	39.57	19.41
Nonirrigation:								
Seed	42.31	61.20	10.82	47.62	NA	15.86	68.89	19.10
Fertilizer	22.07	0.75	NA	15.61	7.08	13.74	14.76	1.94
Pesticide	50.26	49.64	6.79	18.26	NA	13.74	16.50	16.54
Harvesting	NA	NA	NA	NA	NA	88.88	NA	94.88
Hauling	NA	99.70	NA	47.66	38.78	36.67	45.80	56.82
Drying	22.36	56.85	15.77	20.23	21.92	13.41	9.85	17.15
Storage facilities	19.40	92.92	17.42	26.75	27.10	19.58	23.87	18.28
Storage operating	19.61	94.84	16.61	26.75	21.96	15.77	38.97	19.74
Marketing	20.93	84.96	20.01	20.63	23.11	14.51	48.36	21.06

NA = Not applicable.

Table 9—Cash rental agreements for land in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Agreements	1,054	322	421	85	237	191	184	2,494
				Percent of agreements				
Including additional input costs	10.0	18.0	42.2	86.0	0	24.8	19.0	19.9
				Dollars per acre				
Average rent under agreements: 1/								
For land only	57.00	D	63.40	D	33.20	41.20	121.50	59.10
Including additional input costs	D	D	60.80	79.60	NA	50.50	144.00	74.80
				Coefficient of variation				
Agreements	49.55	38.25	33.91	41.98	13.91	15.39	22.93	30.67
Including additional input costs	66.34	88.60	40.63	11.23	NA	30.24	52.16	45.43
Average rent under agreements: 1/								
For land only	1.72	NA	51.23	NA	46.49	7.15	8.80	37.78
Including additional input costs	NA	NA	15.98	25.65	NA	15.71	4.90	15.76

NA = Not applicable.
D = Insufficient data for disclosure.
1/ Mean per type of cash rental agreement.

Table 10—Levee surveying and other technical services hired for rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent of acreage				
Custom-hired surveying for levees	61.1	77.9	96.4	14.8	52.3	44.0	92.3	55.1
Custom-hired technical services 1/	4.6	9.0	2.2	1.4	23.2	9.8	.9	7.8
				Dollars per acre				
Average cost of custom levee surveying 2/	3.65	3.43	2.99	1.59	3.19	3.18	5.69	3.34
				Coefficient of variation				
Custom-hired surveying for levees	25.56	9.82	3.32	52.07	11.18	11.49	26.54	9.23
Custom-hired technical services 1/	43.44	45.37	76.54	61.16	37.48	46.20	76.71	52.35
Average cost of custom levee surveying 2/	5.11	9.99	7.53	16.24	7.64	7.59	33.82	7.16

1/ Soil tests, tissue analysis, and scouting.
2/ Mean per farm producing rice and reporting item.

Table 11—Field operations in rice production, 1984 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Times-over 2/				
All field operations	5.29	7.87	6.82	4.29	5.91	9.33	5.62	6.30
Tillage	3.01	5.38	4.48	2.86	4.48	6.75	3.65	4.16
Plowing	.09	.10	.02	.44	.07	.21	1.19	.28
Disking	1.30	2.68	1.96	1.38	1.88	2.30	1.91	1.92
Cultivating	.60	.73	1.56	.47	1.21	1.41	.06	.76
Harrowing	.61	.10	.57	.44	1.10	2.07	.38	.54
Bedding and shaping	.01	.05	.06	.01	.05	.01	.06	.04
Soil packing	.32	1.16	.17	.08	.19	.75	.05	.45
Other tillage	.08	.56	.14	.04	0	0	0	.17
Fertilizer and pesticide applications	.11	.25	.12	.21	.02	.04	.88	.25
Seeding and planting	1.21	1.26	1.31	.25	.44	1.00	.16	.90
Harvesting	.96	.98	.91	.97	.97	1.54	.93	.99
				Coefficient of variation				
All field operations	9.88	11.74	4.42	7.23	13.77	5.79	4.94	12.82
Tillage	25.84	18.55	6.12	9.05	15.94	7.11	8.18	20.29

1/ Excluding operations custom hired.
2/ Acres covered in operation divided by total acres.

Table 12—Size of implements commonly used in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Feet				
Average width: 1/								
Chisel plow	23.1	19.9	NA	18.7	18.0	17.0	17.3	18.2
Regular tandem disk	21.6	22.2	20.0	21.5	18.0	17.3	18.6	21.0
Field cultivator	27.5	30.6	22.7	19.4	24.3	28.2	23.1	25.7
Spike-toothed harrow	22.8	NA	NA	19.1	20.0	21.9	23.9	21.2
Roller packer	17.7	20.5	14.4	10.4	25.8	28.4	17.5	20.2
Landall	19.5	21.0	NA	12.7	NA	NA	NA	20.6
Plain disk drill seeder	19.9	18.5	15.5	16.2	17.8	16.6	16.1	17.6
Landplane	17.2	17.8	23.9	17.1	26.2	20.3	17.5	18.8
Levee plow/disk	6.2	10.5	7.0	7.8	10.1	10.9	13.3	8.4
				Horsepower				
Average power takeoff: 1/								
Chisel plow	206.7	142.3	NA	159.0	191.0	136.7	168.0	169.1
Regular tandem disk	165.6	171.3	155.5	176.7	169.6	153.9	173.3	165.4
Field cultivator	172.5	181.1	163.9	150.4	187.6	155.4	195.2	170.1
Spike-toothed harrow	156.1	NA	NA	139.8	140.0	138.5	155.6	141.6
Roller packer	167.1	178.2	115.2	216.2	107.6	120.7	129.6	165.2
Landall	145.8	150.7	NA	148.5	NA	NA	NA	149.4
Plain disk drill seeder	149.1	137.3	104.2	132.0	122.9	119.8	122.8	127.3
Landplane	175.9	153.4	162.1	170.3	163.5	156.1	173.6	164.7
Levee plow/disk	139.3	143.6	146.2	149.1	146.9	133.7	113.8	143.3
				Coefficient of variation				
Average width: 1/								
Chisel plow	6.56	22.17	NA	10.09	13.54	11.97	3.81	13.05
Regular tandem disk	7.56	30.46	NA	18.78	10.44	7.91	4.46	19.54
Field cultivator	3.96	6.31	4.28	10.92	4.57	2.76	13.20	9.71
Spike-toothed harrow	7.77	NA	NA	5.78	6.95	9.84	6.92	6.85
Roller packer	9.14	4.14	2.49	25.77	12.22	6.42	4.50	3.4
Landall	5.60	5.77	NA	38.90	NA	NA	NA	2.65
Plain disk drill seeder	2.49	5.42	10.24	12.73	13.63	5.75	8.33	5.12
Landplane	7.37	14.82	33.51	4.80	16.98	11.85	3.70	3.27
Levee plow/disk	3.85	2.89	8.63	4.10	4.94	7.09	25.67	4.63
Average power takeoff: 1/								
Chisel plow	7.56	30.46	NA	18.78	10.44	7.91	4.46	19.54
Regular tandem disk	3.30	6.25	5.03	3.85	3.91	3.82	9.80	5.46
Field cultivator	2.42	10.60	4.85	4.69	7.72	5.31	12.15	6.35
Spike-toothed harrow	9.74	NA	NA	12.39	7.32	7.26	7.78	19.62
Roller packer	8.02	12.55	11.05	17.83	15.39	6.78	7.76	11.84
Landall	3.39	5.83	NA	6.04	NA	NA	NA	4.98
Plain disk drill seeder	3.97	8.60	5.68	12.67	9.82	4.85	43.87	6.43
Landplane	4.92	11.20	5.90	4.42	7.40	6.56	4.87	11.15
Levee plow/disk	3.85	2.89	8.63	4.10	4.94	7.09	25.67	4.63

NA = Not applicable.
1/ Mean per farm producing rice and reporting item.

Table 13—Seeding methods and seeding rates for rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent of acreage				
Seeded from:								
Airplanes—								
Flooded land-								
Wet seed	2	0	0	52	9	0	94	16
Dry seed	2	0	0	22	26	2	1	4
Dry land	9	3	0	4	30	12	2	2
Drill seeders	71	41	94	16	26	80	1	53
Broadcast seeders	15	56	6	6	9	6	2	21
				Pounds per acre 1/				
Applied from:								
Airplanes—								
Flooded land-								
Wet seed	D	NA	NA	135	125	NA	160	136
Dry seed	D	NA	NA	145	113	D	D	137
Dry land	135	140	NA	139	117	122	D	134
Drill seeders	105	122	116	126	95	105	D	114
Broadcast seeders	124	142	131	137	127	119	D	138
				Coefficient of variation				
Seeded from:								
Airplanes—								
Flooded land-								
Wet seed	61.59	NA	NA	11.63	36.42	NA	2.58	26.86
Dry seed	61.67	NA	NA	22.96	18.69	91.76	71.64	33.89
Dry land	39.82	78.41	NA	51.82	18.54	32.63	96.08	51.65
Drill seeders	12.59	29.17	3.98	26.98	18.90	5.98	81.30	23.54
Broadcast seeders	42.16	22.37	67.64	48.78	36.56	45.27	96.82	44.59
Applied from:								
Airplanes—								
Flooded land-								
Wet seed	NA	NA	NA	1.17	3.13	NA	1.49	1.20.
Dry seed	NA	NA	NA	1.49	4.38	NA	NA	1.79
Dry land	7.18	21.48	NA	2.62	4.48	5.37	NA	13.10
Drill seeders	2.29	5.52	2.26	5.52	4.10	1.90	NA	2.14
Broadcast seeders	3.76	6.35	8.78	4.12	7.02	7.36	NA	4.89

NA = Not applicable.
D = Insufficient data for disclosure.
1/ Mean per farm producing rice and reporting item.

Table 14—Fertilizer applied in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Pounds per acre				
Nutrient:								
Nitrogen	160.2	101.1	122.2	94.3	125.9	134.4	90.4	118.5
Phosphorus	1.4	5.3	5.1	49.2	42.6	42.9	41.8	20.0
Potash	3.1	14.6	8.0	41.5	22.2	27.1	1.9	14.3
				Coefficient of variation				
Nutrient:								
Nitrogen	18.01	9.08	9.27	4.49	6.47	33.33	7.24	9.27
Phosphorus	58.17	45.74	43.60	5.19	9.09	5.40	8.77	27.96
Potash	49.00	46.09	42.79	7.12	15.11	6.67	45.80	38.69

Table 15—Pesticide applications and costs in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent of farms				
Pesticides exclusively:								
Custom applied	42.1	75.1	57.8	56.1	73.4	77.5	66.8	61.5
Operator applied	32.7	7.0	.2	7.2	1.7	1.7	11.5	10.6
Pesticides both custom and operator applied	7.6	2.1	.8	3.4	1.6	4.5	6.4	3.5
				Dollars per acre				
Cost of pesticides: 1/								
Custom applied	21.38	24.05	29.74	17.76	36.44	44.82	37.78	27.24
Operator applied 2/	12.87	1.46	.35	7.04	.38	2.91	6.00	5.24
				Coefficient of variation				
Pesticides exclusively:								
Custom applied	28.43	11.05	32.86	11.27	7.43	6.45	8.08	23.42
Operator applied	53.66	41.57	94.90	55.18	91.94	91.76	32.38	58.88
Pesticides both custom and operator applied	52.95	68.57	102.19	101.41	91.94	52.40	44.32	56.92
Cost of pesticides: 1/								
Custom applied	17.52	10.68	23.18	15.50	17.69	10.47	15.41	12.42
Operator applied 2/	39.66	52.43	71.35	61.61	67.63	53.13	45.66	52.40

1/ On farms producing rice and reporting item.
2/ Materials only.

Table 16—Hand labor in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Hours per acre				
All hand labor	8.62	5.24	2.41	3.87	7.34	5.00	6.01	5.20
Burning straw	.59	.10	.04	.07	.04	.01	.13	.18
Flagging for aerial applications	.65	.27	.12	.25	.16	.24	.01	.27
Cleaning field ditches	.90	.26	.08	.27	.54	.24	.14	.34
Installing levee gates, spills, and boxes	1.17	.71	.30	.35	.56	.59	.78	.65
Flushing	.61	.61	.16	.39	.97	.53	.21	.44
Flooding	1.54	.91	.27	.88	1.78	1.32	1.00	.93
Walking levees and attending water	1.44	1.58	1.01	.72	1.19	1.28	1.10	1.23
Cutting levees and draining fields	.88	.42	.20	.40	1.07	.49	.75	.52
Other hand labor	.84	.38	.23	.54	1.03	.30	1.89	.64
				Coefficient of variation				
All hand labor	31.18	20.15	35.05	35.35	11.22	22.95	20.98	11.26

Table 17—Sources and costs of irrigation water in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent				
Rice acreage irrigated from:								
Wells	88.4	97.8	77.5	46.1	25.6	51.8	4.0	65.7
Canals 1/	.2	0	1.4	21.8	57.5	48.2	85.0	21.4
Surface sources—								
Free flowing to operation	.7	.1	.1	.2	1.9	0	2.3	.7
Pumped by own pumps	10.4	4.2	21.0	31.9	15.0	0	7.4	12.5
Pumped by others	.3	0	0	0	0	0	1.3	.2
Farms irrigated from:								
Wells only	75.8	88.5	77.6	41.5	16.0	46.6	3.2	65.2
Canals only	.2	0	.2	22.8	64.6	47.2	74.3	14.2
Surface sources only	10.4	4.2	21.0	31.9	15.0	0	7.4	12.5
More than one source	15.2	11.5	12.4	12.9	6.9	6.2	15.5	12.6
				Dollars per acre				
Average cost of purchased water 2/	D	NA	D	47.32	54.46	71.65	24.83	40.62
				Coefficient of variation				
Rice acreage irrigated from:								
Wells	4.55	3.07	9.51	16.23	32.10	13.05	33.27	5.36
Canals 1/	68.34	NA	91.18	29.30	14.19	14.02	4.34	27.58
Surface sources—								
Free flowing to operation	52.72	101.85	102.46	97.44	71.18	NA	92.34	49.35
Pumped by own pumps	36.29	42.94	33.95	24.63	29.75	NA	35.41	32.08
Pumped by others	101.92	NA	NA	NA	NA	NA	72.86	32.08
Farms irrigated from:								
Wells only	10.90	5.70	11.76	14.77	28.48	12.75	56.57	5.84
Canals only	67.40	NA	94.90	19.00	8.30	11.12	3.88	27.01
Surface sources only	52.00	NA	56.01	23.09	30.87	NA	43.03	38.91
More than one source	38.79	43.67	47.29	31.25	40.34	45.27	25.42	34.59
Average cost of purchased water 2/	NA	NA	NA	26.61	13.01	15.44	7.95	15.23

NA = Not applicable.
D = Insufficient data for disclosure.
1/ Water purchased from canal company, association, or irrigation district.
2/ On farms producing rice and reporting item.

Table 18—Irrigation pumps: Power types and pumping rates in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Pumps:								
Total	3,189	5,306	4,554	1,390	266	308	729	15,742
Average 1/	1.6	1.9	2.0	1.1	.6	.8	.8	1.6
				Percent				
Pumps powered by:								
Gasoline	.2	.3	0	4.4	1.9	4.4	0	.7
Liquefied petroleum gas	6.3	24.3	7.3	7.8	7.7	3.8	0	12.5
Diesel	47.3	34.2	34.7	51.3	37.7	17.2	1.1	36.7
Electricity	45.5	40.8	48.1	5.3	36.1	22.6	97.8	42.9
Natural gas	0	.3	8.4	29.2	16.6	52	0	6.4
Tractor	.7	0	1.5	2	0	0	1.1	.8
				Gallons per minute				
Average pumping rate pumps powered by: 2/								
Gasoline	D	D	NA	D	D	D	NA	2,877
Liquefied petroleum gas	2,120	1,159	999	1,160	1,350	1,370	NA	1,233
Diesel	2,076	1,371	1,141	2,375	2,667	1,427	D	1,640
Electricity	1,765	1,337	989	2,288	1,351	1,985	2,532	1,459
Natural gas	NA	D	1,716	2,050	1,800	1,752	NA	1,865
Tractor	1,500	NA	800	1,744	NA	NA	D	1,233
				Coefficient of variation				
Pumps:								
Total	27.49	27.29	34.04	12.14	18.20	18.11	15.37	25.17
Average 1/	17.58	32.00	32.04	11.50	20.15	18.49	19.02	21.04
Pumps powered by:								
Gasoline	66.74	100.66	NA	67.96	89.03	90.38	NA	65.35
Liquefied petroleum gas	35.07	35.45	49.42	45.59	61.62	73.72	NA	50.57
Diesel	27.77	25.31	32.50	11.56	16.25	29.28	93.57	19.30
Electricity	19.92	28.36	33.88	46.25	25.57	29.10	NA	26.58
Natural gas	NA	100.66	50.30	18.92	43.57	14.53	NA	36.99
Tractor	57.71	NA	82.49	88.68	NA	NA	93.57	67.53
Average pumping rate pumps powered by: 2/								
Gasoline	NA	NA	NA	NA	NA	NA	NA	104.95
Liquefied petroleum gas	19.12	26.78	36.08	37.83	10.71	62.46	NA	19.05
Diesel	29.67	50.47	51.60	26.13	21.16	21.46	NA	28.94
Electricity	24.92	14.46	14.79	45.68	23.29	36.82	13.81	10.47
Natural gas	NA	NA	45.74	16.97	66.30	19.77	NA	43.68
Tractor	16.62	NA	34.50	12.60	NA	NA	NA	38.61

NA = Not applicable.
D = Insufficient data for disclosure.
1/ Mean per farm producing rice.
2/ Mean per farm producing rice and reporting item.

Table 19—Tractors: Power takeoff, type of fuel, and hours of use, by drive type on farms producing rice, 1984 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Tractors:								
Two-wheel drive—								
Total	6,130	8,279	7,890	3,810	1,056	1,175	732	29,073
Average 2/	3.0	3.0	3.4	3.1	2.6	3.0	.1	2.9
Four-wheel drive—								
Total	1,669	1,793	716	881	702	43	710	6,904
Average 2/	.8	.6	.3	.7	1.7	1.1	.8	.7
Crawlers—								
Total	13	0	69	38	10	0	1,811	1,941
Average 2/	3/	NA	3/	3/	3/	NA	2	.2
Four-wheel assisted—								
Total	285	60	116	72	61	0	35	630
Average 2/	.1	3/	.1	.1	.1	NA	3/	.1
				Horsepower				
Average power takeoff: 4/								
Two-wheel drive	137.6	125.2	131.7	116.9	117.8	111.1	97.1	127.0
Four-wheel drive	182.4	210.5	181.1	172.4	187.5	164.3	186.7	188.1
Crawler	137.7	NA	116.1	76.0	78.0	NA	167.9	163.6
Four-wheel assisted	204.8	196.6	85.0	125.9	229.6	NA	123.8	170.8
				Percent				
Powered by diesel:								
Two-wheel drive	98.3	87.3	96.8	95.3	96.9	87.0	93.8	93.7
Four-wheel drive	99.8	100.0	100.0	100.0	100.0	95.3	96.1	99.2
Crawler	100.0	NA	100.0	100.0	100.0	NA	100.0	100.0
Four-wheel assisted	100.0	100.0	100.0	100.0	100.0	NA	100.0	100.0
				Hours				
Average use: 4/								
Two-wheel drive	616.6	476.1	652.2	385.2	468.4	418.6	292.4	534.4
Four-wheel drive	728.9	534.7	485.1	534.7	870.9	484.1	499.4	589.4
Crawler	267.7	NA	346.5	375.1	450.0	NA	333.2	334.6
Four-wheel assisted	662.7	316.8	450.0	344.0	705.6	NA	75.9	525.6

See notes at end of table.

Continued—

Table 19—Tractors: Power takeoff, type of fuel, and hours of use, by drive type on farms producing rice, 1984 —Continued 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
	Coefficient of variation							
Tractors:								
Two-wheel drive—								
Total	34.59	28.39	37.97	10.59	11.72	11.32	11.86	27.78
Average 2/	9.78	6.74	7.30	6.46	7.31	6.75	11.05	6.26
Four-wheel drive—								
Total	21.99	42.02	29.06	18.75	11.80	15.99	11.42	40.52
Average 2/	31.00	18.80	40.60	17.70	9.50	13.30	10.90	31.30
Crawlers—								
Total	53.31	NA	77.05	60.12	62.67	NA	8.65	17.04
Average 2/	60.03	NA	82.18	60.06	62.41	NA	8.07	29.51
Four-wheel assisted—								
Total	44.69	65.76	69.59	66.82	47.94	NA	79.21	39.34
Average 2/	57.34	70.95	69.59	72.31	52.75	NA	93.56	59.61
Average power takeoff: 4/								
Two-wheel drive	3.17	2.91	5.09	2.99	2.81	2.76	5.55	3.61
Four-wheel drive	7.09	4.10	9.65	5.88	5.76	5.14	3.28	5.46
Crawler	44.52	NA	25.29	27.94	1.65	NA	5.29	4.80
Four-wheel assisted	5.15	37.86	NA	37.36	19.34	NA	8.40	17.54
Powered by diesel:								
Two-wheel drive	1.12	6.36	2.12	1.44	1.52	4.01	3.06	5.48
Four-wheel drive	6.20	NA	NA	NA	NA	3.07	2.70	0.11
Crawler	NA	NA	NA	NA	NA	NA	NA	NA
Four-wheel assisted	NA	NA	NA	NA	NA	NA	NA	NA
Average use: 4/								
Two-wheel drive	18.63	9.13	15.48	8.11	12.79	7.72	16.57	8.80
Four-wheel drive	15.11	12.39	14.34	15.76	18.17	6.27	14.13	13.57
Crawler	8.99	NA	15.69	31.89	7.14	NA	9.82	10.16
Four-wheel assisted	9.51	14.13	7.85	62.95	20.06	NA	26.83	9.76

NA = Not applicable.
1/ All uses on farms producing rice.
2/ Mean per farm producing rice.
3/ Less than one-tenth.
4/ Mean per type of tractor.

Table 20—Tractors: Ages and how purchased, by drive type on farms producing rice, 1984 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Year 2/				
Average year of manufacture: 3/								
Two-wheel drive	77	73	74	74	73	72	71	74
Four-wheel drive	78	78	78	78	76	75	75	77
Crawler	71	NA	70	76	78	NA	59	60
Four-wheel assisted	79	79	83	80	77	NA	59	80
				Percent				
Bought new:								
Two-wheel drive	63.8	53.9	69.0	55.1	62.6	55.5	35.0	60.1
Four-wheel drive	56.3	33.9	70.0	78.9	61.0	56.1	58.9	55.5
Crawler	32.3	NA	0	52.2	50.0	NA	31.0	30.4
Four-wheel assisted	45.2	61.3	100.0	100.0	54.7	NA	0	61.5
Bought used:								
Two-wheel drive	33.6	42.7	29.6	43.3	37.4	41.8	46.7	37.2
Four-wheel drive	41.6	60.4	22.9	18.9	39	43.9	28.9	40.2
Crawler	67.7	NA	100.0	47.8	50	NA	56.8	58.2
Four-wheel assisted	53.3	30.7	0	0	33.6	NA	40.0	32.6
Leased:								
Two-wheel drive	2.6	3.5	1.4	1.6	0	2.7	18.3	2.7
Four-wheel drive	2.2	5.7	7.1	2.2	0	0	12.3	4.3
Crawler	0	NA	0	0	0	NA	12.2	11.4
Four-wheel assisted	1.5	8.0	0	0	11.7	NA	60.0	5.9
				Coefficient of variation				
Average year of manufacture: 3/								
Two-wheel drive	1.37	2.45	1.88	1.06	.76	1.05	4.13	1.86
Four-wheel drive	1.25	4.34	7.39	2.32	.46	.71	2.65	1.5
Crawler	3.68	NA	1.55	.93	2.47	NA	3.74	4.93
Four-wheel assisted	1.72	2.71	NA	2.71	1.98	NA	26.83	.97
Bought new:								
Two-wheel drive	18.78	77.87	18.29	10.08	9.62	10.91	20.64	13.53
Four-wheel drive	35.89	89.15	29.01	22.17	14.84	20.79	14.89	79.86
Crawler	49.19	NA	NA	6.52	64.26	NA	18.26	85.19
Four-wheel assisted	46.25	23.42	NA	9.51	56.29	NA	NA	17.94
Bought used:								
Two-wheel drive	28.87	39.58	72.13	11.99	14.10	12.58	16.80	42.26
Four-wheel drive	46.33	24.09	47.20	40.59	15.92	15.72	18.59	17.61
Crawler	63.42	NA	34.50	111.73	64.26	NA	12.03	59.94
Four-wheel assisted	20.12	47.00	NA	NA	39.23	NA	3.91	74.61
Leased:								
Two-wheel drive	52.03	86.89	97.70	57.11	NA	55.14	32.35	66.24
Four-wheel drive	59.94	110.10	106.28	102.25	NA	NA	32.98	91.48
Crawler	NA	NA	NA	NA	NA	NA	26.38	88.38
Four-wheel assisted	104.53	113.74	NA	NA	79.88	NA	40.77	83.32

NA = Not applicable.
1/ All uses on farms producing rice
2/ Final two digits only.
3/ Mean per purchased tractor.

Table 21—Combines: Age and how purchased, by drive type in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Combines:								
Two-wheel drive—								
Total	2,070	1,749	2,544	1,330	517	726	37	8,972
Average 1/	1	.6	1.1	1.1	1.3	1.9	2/	.9
Four-wheel drive—								
Total	1,067	770	635	349	272	95	15	3,203
Average 1/	.5	.3	.3	.3	.7	.2	2/	.3
Track drive—								
Total	208	0	0	0	0	7	1,166	1,381
Average 1/	.1	NA	NA	NA	NA	2/	1.3	.1
Combination drive—3/								
Total	6	717	0	0	5	0	346	1,073
Average 1/	2/	.3	NA	NA	NA	NA	.4	.1
				Year 4/				
Average year of manufacture: 5/								
Two-wheel drive	78	76	75	76	74	75	77	76
Four-wheel drive	80	80	79	80	78	80	81	80
Track drive	79	NA	NA	NA	NA	79	74	75
Combination drive	80	79	NA	NA	81	NA	77	78
				Percent				
Bought new:								
Two-wheel drive	68.9	34.8	58.7	53.7	55.9	54.2	19.1	55.0
Four-wheel drive	64.6	69.3	65.1	86.4	75.0	81.5	100.0	69.7
Track drive	70.6	NA	NA	NA	NA	100.0	53.7	56.5
Combination drive	100.0	100.0	NA	NA	100.0	NA	62.3	87.8

See notes at end of table.

Continued—

Table 21—Combines: Age and how purchased, by drive type in rice production, 1984—Continued

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Coefficient of variation				
Combines:								
Two-wheel drive—								
Total	29.90	16.72	31.46	12.43	14.01	11.25	49.20	22.17
Average 1/	28.48	29.40	26.52	10.17	12.49	8.43	74.55	35.98
Four-wheel drive—								
Total	17.83	24.81	30.17	24.51	16.71	27.12	65.92	18.19
Average 1/	49.75	44.14	58.18	40.67	20.58	39.91	69.81	37.78
Track drive—								
Total	17.08	NA	NA	NA	NA	92.76	9.84	9.68
Average 1/	32.60	NA	NA	NA	NA	92.17	11.78	27.45
Combination drive—3/								
Total	81.09	100.00	NA	NA	88.19	NA	27.04	98.25
Average 1/	85.54	75.07	NA	NA	88.17	NA	30.52	86.44
Average year of manufacture: 5/								
Two-wheel drive	1.24	1.67	1.44	.85	.98	1.00	1.42	.91
Four-wheel drive	.59	.49	.85	.78	.84	.62	1.22	.52
Track drive	.68	NA	NA	NA	NA	NA	1.33	1.00
Combination drive	NA	NA	NA	NA	NA	NA	3.97	.82
Bought new:								
Two-wheel drive	34.11	14.28	68.14	14.28	13.86	12.00	20.72	31.36
Four-wheel drive	17.03	28.08	26.05	18.69	10.07	16.01	69.64	22.23
Track drive	13.55	NA	NA	NA	NA	NA	11.16	12.11
Combination drive	NA	NA	NA	NA	NA	NA	21.00	1.01

NA = Not applicable.
1/ Mean per farm producing rice.
2/ Less than one-tenth.
3/ Combination track and wheel drive.
4/ Final two digits only.
5/ Mean per purchased combine.

Table 22—Rice buggies: Capacity and how propelled in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Rice buggies:								
Total	2,455	4,412	3,355	1,688	745	839	1,217	14,709
Average 1/	1.2	1.6	1.5	1.4	1.8	2.1	1.3	1.5
				Hundredweight				
Average capacity 2/	117.9	100.1	119.5	101.1	114.2	127	136.6	112.5
				Percent				
Rice buggies:								
Self-propelled	0	0	0	0	24	2	73	7
Pulled by tractor	100	100	100	100	76	98	27	93
				Coefficient of variation				
Rice buggies:								
Total	16.19	33.90	44.07	10.70	10.38	11.08	8.50	32.02
Average 1/	36.60	43.42	44.05	10.15	7.82	7.29	11.01	28.10
Average capacity 2/	6.72	11.61	4.11	5.32	46.99	12.56	4.03	10.34
Rice buggies:								
Self-propelled	NA	NA	NA	NA	19.27	66.23	6.17	33.80
Pulled by tractor	NA	NA	NA	NA	6.73	.93	19.04	.26

NA = Not applicable.
1/ Mean per farm producing rice.
2/ Mean per rice buggy.

Table 23—Trucks: Miles driven, age, and fuel type, by drive type on farms producing rice, 1984 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Number				
Trucks:								
Pickup—								
Total	3,672	4,924	2,845	1,983	908	789	2,461	17,582
Average 2/	1.8	1.8	1.2	1.6	2.2	2.0	2.7	1.7
Single-axle—								
Total	3,206	4,329	3,360	1,549	425	342	1,246	14,457
Average 2/	1.6	1.5	1.5	1.2	1.0	.9	1.3	1.4
Tandem-axle—								
Total	934	694	1,564	331	168	102	80	3,874
Average 2/	.5	.2	.7	.3	.4	.3	.9	.4
Semi—								
Total	395	592	305	87	53	32	62	1,527
Average 2/	.2	.2	.1	.2	.1	.1	.1	.2
				Miles				
Average use: 3/								
Pickup	18,577	10,966	12,411	14,433	13,788	15,909	7,286	13,207
Single-axle	6,187	1,276	2,554	3,161	5,579	2,527	6,080	3,434
Tandem-axle	3,282	2,589	1,246	3,816	4,601	3,067	5,913	2,487
Semi	2,086	3,606	3,480	8,029	3,163	6,852	3,495	3,487
				Year 4/				
Average year of manufacture: 3/								
Single-axle	74	70	66	71	71	68	67	70
Tandem-axle	72	72	73	74	70	72	60	72
Semi	70	74	68	79	72	77	63	72
				Percent				
Trucks fueled by:								
Gasoline—								
Single-axle	90.4	89.4	95.4	99.6	97.9	98.0	85.9	92.3
Tandem-axle	62.8	99.3	88.0	77.9	53.4	95.6	19.6	80.4
Semi	46.3	40.5	38.1	0	0	63.5	0	36.6
L.P. gas—								
Single-axle	2.8	.9	0	0	0	0	1.3	1.0
Tandem-axle	1.7	0	0	0	0	0	0	.4
Semi	0	0	0	0	0	0	0	0
Diesel—								
Single-axle	6.8	9.7	4.6	.4	2.1	2.0	12.7	6.7
Tandem-axle	35.5	.7	12.0	22.1	46.6	4.4	80.4	19.2
Semi	53.7	59.5	61.9	100.0	100.0	36.5	100.0	63.4

See notes at end of table.

Continued—

Table 23—Trucks: Miles driven, age, fuel type, by drive type on farms producing rice, 1984—Continued 1/

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
	Coefficient of variation							
Trucks:								
Pickup—								
Total	19.36	31.48	29.00	10.96	11.80	11.27	9.07	26.32
Average 2/	30.16	37.85	32.08	8.63	9.71	9.43	8.91	28.29
Single-axle—								
Total	34.26	50.60	26.88	12.47	14.60	18.35	12.38	34.88
Average 2/	19.40	55.50	20.34	13.03	13.95	22.22	16.86	38.36
Tandem-axle—								
Total	27.51	27.58	49.96	23.89	21.54	31.47	36.21	44.94
Average 2/	45.73	44.18	47.59	33.85	22.81	39.49	45.44	62.78
Semi—								
Total	41.41	33.22	40.05	54.92	39.75	49.72	47.38	28.08
Average 2/	59.43	74.03	62.78	67.42	44.21	58.85	50.88	44.68
Average use: 3/								
Pickup	14.23	11.07	10.76	6.82	7.25	8.74	9.77	7.50
Single-axle	26.18	35.49	33.31	15.04	21.51	18.47	19.53	31.22
Tandem-axle	13.65	38.47	18.59	26.37	16.16	35.85	65.11	23.26
Semi	32.85	27.71	19.25	62.93	36.39	30.98	56.20	22.44
Average year of manufacture: 3/								
Single-axle	1.16	1.57	1.67	.98	1.35	1.49	1.56	1.06
Tandem-axle	1.94	1.49	4.35	9.94	1.80	1.74	6.33	3.65
Semi	4.04	2.37	2.74	52.39	2.05	.98	7.65	3.27
Trucks fueled by:								
Gasoline—								
Single-axle	4.68	7.15	2.02	.35	1.91	1.72	4.33	2.65
Tandem-axle	16.10	.65	9.80	12.41	15.78	4.20	55.71	5.58
Semi	45.11	39.08	52.53	NA	NA	34.76	NA	27.60
L.P. gas—								
Single-axle	42.28	82.78	NA	NA	NA	NA	95.19	47.36
Tandem-axle	63.16	NA	NA	NA	NA	NA	NA	78.06
Semi	NA	NA	NA	NA	NA	NA	NA	NA
Diesel—								
Single-axle	52.10	61.54	59.02	91.62	88.55	85.19	28.57	46.15
Tandem-axle	29.04	92.10	71.93	43.81	18.11	91.28	13.59	58.20
Semi	38.84	26.56	32.29	NA	NA	60.52	NA	30.85

NA = Not applicable.
1/ All uses on farms producing rice
2/ Mean per farms producing rice.
3/ Mean per type of truck.
4/ Final two digits only.

Table 24—Type of dryer, percent moisture of rice, and cost of commercial drying in rice production, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent				
Rice dried: 1/								
Onfarm	24.3	28.2	12.4	30.2	21.8	9.1	17.9	22.1
Commercially	41.7	58.8	35.2	54.7	74.6	90.9	75.5	52.9
Sold green	34.0	13.0	52.4	15.1	3.6	0	6.7	25.0
Farms with rice dried:								
Onfarm only	22.1	19.5	7.3	26.7	16.5	6.6	13.0	16.9
Commercially only	39.9	55.6	28.6	50.3	72.0	90.2	70.4	49.0
Both onfarm and commercially	2.2	7.9	10.6	5.1	7.0	3.2	10.0	7.0
Sold green only	35.8	17.0	53.5	17.8	4.5	0	6.7	27.0
Average moisture content at harvest 2/	20.0	19.4	18.5	20.1	19.8	20.3	21.8	19.7
				Cents per hundredweight				
Average cost of commercial drying 2/	84	52	57	96	97	78	64	69
				Coefficient of variation				
Rice dried:								
Onfarm	28.72	31.87	43.14	18.37	19.85	36.62	21.62	29.35
Commercially	28.78	20.42	35.64	10.98	6.26	3.65	6.05	27.82
Sold green	50.83	41.53	30.78	29.33	54.08	NA	44.44	39.41
Farms with rice dried:								
Onfarm only	34.58	63.43	76.83	21.04	25.5	45.19	28.28	49.56
Commercially only	27.80	15.77	66.04	13.55	8.02	6.26	7.39	34.88
Both onfarm and commercially	56.99	72.33	75.71	46.32	40.29	65.84	33.09	55.62
Sold green only	54.30	64.57	11.60	26.99	53.68	NA	44.52	39.83
Average moisture content at harvest 2/	.70	2.16	1.40	.77	1.02	.77	1.25	1.33
Average cost of commercial drying 2/	7.74	28.15	14.74	11.36	8.37	13.66	4.92	27.15

NA = Not applicable.
1/ Mean per farm producing rice.
2/ Mean per farm producing rice and reporting item.

Table 25—Type of fuel in onfarm drying of rice, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent				
Dryers fueled by:								
Gasoline	0.8	2.0	0	0	0	0	0	0.9
Liquefied petroleum gas	82.1	32.7	63.3	36.1	25.1	18.8	27.4	48.0
Diesel	.6	0	0	0	5.6	0	0	.3
Electricity	12.5	46.6	0	5.6	49.5	36.5	23.8	24.0
Natural gas	4.0	1.0	36.7	58.3	4.9	44.7	24.2	18.1
Natural air only	0	17.7	0	0	15.1	0	24.6	8.7
				Coefficient of variation				
Dryers fueled by:								
Gasoline	91.35	98.06	NA	NA	NA	NA	NA	97.53
Liquefied petroleum gas	10.29	33.21	25.46	28.54	40.42	82.80	36.22	21.82
Diesel	88.01	NA	NA	NA	88.11	NA	NA	64.48
Electricity	69.37	24.73	NA	94.81	23.60	51.23	42.03	28.41
Natural gas	37.83	63.56	43.84	18.20	87.46	41.44	37.43	43.12
Natural air only	NA	51.87	NA	NA	59.50	NA	37.18	55.23

NA = Not applicable.

Table 26—Means, distances, and costs of hauling rice to dryers, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Percent				
Rice dried onfarm:								
Hauled in own truck	98.0	91.7	100	93.8	69.1	81.2	85.0	93.0
Custom-hauled	2.0	8.3	0	6.2	30.9	18.8	15.0	7.0
				Miles				
Average distance to dryer 1/	5.9	6.7	5.5	5.7	7.4	6.1	7.3	6.2
				Cents per hundredweight				
Average cost of custom hauling 1/	11	20	NA	26	23	D	66	26
				Percent				
Rice dried in commercial dryer:								
Hauled in own truck	76.3	99.7	98.0	87.4	50.7	38.8	27.8	78.5
Custom-hauled	23.7	.3	2.0	12.6	49.3	61.2	72.2	21.5
				Miles				
Average distance to dryer 1/	5.9	6.7	5.5	5.7	7.4	6.1	7.3	6.2
				Cents per hundredweight				
Average cost of custom hauling 1/	.11	.20	NA	.26	.23	D	.66	.26
				Coefficient of variation				
Rice dried onfarm:								
Hauled in own truck	1.06	6.90	NA	5.17	13.84	19.14	7.85	5.36
Custom hauled	52.33	75.98	NA	78.61	30.92	82.80	44.34	81.02
Average distance to dryer 1/	22.90	16.04	41.76	26.94	14.86	21.21	24.97	16.8
Average cost of custom hauling 1/	34.38	103.71	NA	9.24	21.33	NA	56.82	28.63
Rice dried in commercial dryer:								
Hauled in own truck	11.48	.27	1.95	5.91	12.30	14.05	19.56	3.44
Custom hauled	36.93	98.29	98.01	40.98	12.63	8.90	7.51	48.87
Average distance to dryer 1/	26.24	14.61	10.61	11.51	8.18	7.88	12.99	15.05
Average cost of custom hauling 1/	14.29	6.44	NA	17.41	13.26	12.83	7.90	12.20

NA = Not applicable.
D = Insufficient data for disclosure.
1/ Mean per farm producing rice and reporting item.

Table 27—Rice production costs and returns, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Dollars per acre				
Cash receipts 1/	344.73	375.79	389.68	323.59	376.51	466.12	534.86	393.22
Cash expenses	303.93	285.61	297.32	314.76	390.97	462.53	474.72	345.08
Variable expenses	235.65	212.90	218.47	248.12	318.79	373.90	288.29	255.13
Seed	23.48	27.60	24.10	24.21	25.75	26.50	26.56	25.51
Fertilizer	39.61	26.89	31.00	39.84	39.11	41.36	37.38	35.61
Chemicals	12.87	1.48	.35	7.04	.38	2.91	6.00	5.51
Custom operations	49.32	34.43	44.68	36.31	66.21	76.25	58.34	47.92
Fuel, lube, and electricity	43.98	46.33	46.10	17.13	46.33	52.56	26.82	38.72
Repairs	22.03	30.08	39.00	22.46	23.35	32.56	34.65	28.23
Hired labor	12.64	17.86	14.13	15.80	13.79	15.99	19.39	15.90
Purchased water	0	0	0	47.32	54.46	71.65	24.83	20.45
Drying	26.18	22.82	14.20	37.09	45.03	46.50	46.04	32.04
Technical services	5.54	5.41	4.91	.92	4.38	7.62	8.28	5.24
Fixed expenses	68.28	72.71	78.85	66.65	72.18	88.63	186.43	89.95
Farm overhead	16.37	17.48	18.71	16.56	19.97	24.13	55.16	23.67
Taxes and insurance	10.33	10.84	12.62	8.03	9.57	12.97	22.28	12.26
Interest 2/	41.58	44.39	47.52	42.06	42.64	51.53	108.99	54.02
Receipts less cash expenses	40.80	89.98	92.36	8.83	-14.46	3.59	60.14	48.14
Capital replacement	45.11	53.56	64.21	30.25	34.22	64.63	62.22	49.71
Receipts less cash expenses and replacement	-4.31	36.42	28.15	-21.42	-48.68	-61.04	-2.08	-1.57
Economic costs 3/	393.73	416.64	448.11	412.72	451.20	567.93	594.39	454.70
Variable expenses	235.65	212.90	218.47	248.12	318.79	373.90	288.29	255.13
Farm overhead	16.37	17.48	18.71	16.56	19.97	24.13	55.16	23.67
Taxes and insurance	10.33	10.84	12.62	8.03	9.57	12.97	22.28	12.26
Capital replacement	45.11	53.56	64.21	30.25	34.22	64.63	62.22	49.71
Return to operating capital 4/	6.80	6.58	7.73	6.48	10.99	10.99	10.05	7.88
Return to other nonland capital 5/	10.03	10.39	12.76	6.80	7.48	11.82	12.22	10.12
Net land rent 6/	47.91	74.49	89.54	69.89	26.70	42.25	111.15	68.86
Unpaid labor	21.53	30.40	24.07	26.90	23.48	27.24	33.02	27.07
Residual return to management and risk 7/	-49.00	-41.05	-58.43	-89.13	-74.69	-101.81	-59.53	-61.48

1/ Harvest-period price times yield (app. table 2).
2/ Actual expenditure in 1984 attributed to rice production.
3/ Full-ownership costs, excludes interest payments.
4/ Variable expense items multiplied by part of year used and the 6-month U.S. Treasury bill rate.
5/ Value of machinery and equipment multiplied by longrun rate of return to production assets in farm sector.
6/ Of total acres rented, percentage of cash and share rented acres multiplied by average cash and share rent.
7/ Total economic costs less cash receipts.

Appendix table 1—Counties and crop reporting districts (CRD) in rice growing regions

Region and State	County/CRD
Mississippi River Delta:	
Arkansas	Crittenden
	Mississippi
	Phillips
	CRD 4
	CRD 5
	CRD 7
	Clark
	CRD 9
Louisiana	Catahoula
	Concordia
	CRD 2
	CRD 3
	CRD 4
Mississippi	CRD 1
	Panola
	CRD 4
Missouri	Butler
	Stoddard
Northeast Arkansas	Cross
	Lee
	Monroe
	St. Francis
	Woodruff
	CRD 3, except Mississippi
Grand Prairie of Arkansas	Arkansas
	Lonoke
	Prairie
Southwest Louisiana	CRD 1
	CRD 5, except Catahoula and Concordia
	CRD 7
	CRD 8
Upper Coast of Texas	Brazoria
	Chambers
	Ft. Bend
	Galveston
	Harris
	Jefferson
	Liberty
	Orange
	CRD 5N
	CRD 5S, except Waller
Lower Coast of Texas	Waller
	CRD 8N
	Calhoun
	Jackson
	Matagorda
	Victoria
	Wharton
California	CRD 50
	CRD 51

Appendix table 2—Harvest-month price and yield for rice, 1984

Item	Mississippi River Delta	Northeast Arkansas	Grand Prairie	Southwest Louisiana	Texas Upper Coast	Texas Lower Coast	California	United States
				Dollars per hundredweight				
Harvest-month price of rice	8.03	8.19	8.19	7.82	8.60	8.60	7.63	8.05
				Hundredweight per acre				
Yield	42.93	45.86	47.58	41.38	43.78	54.20	70.10	48.87

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